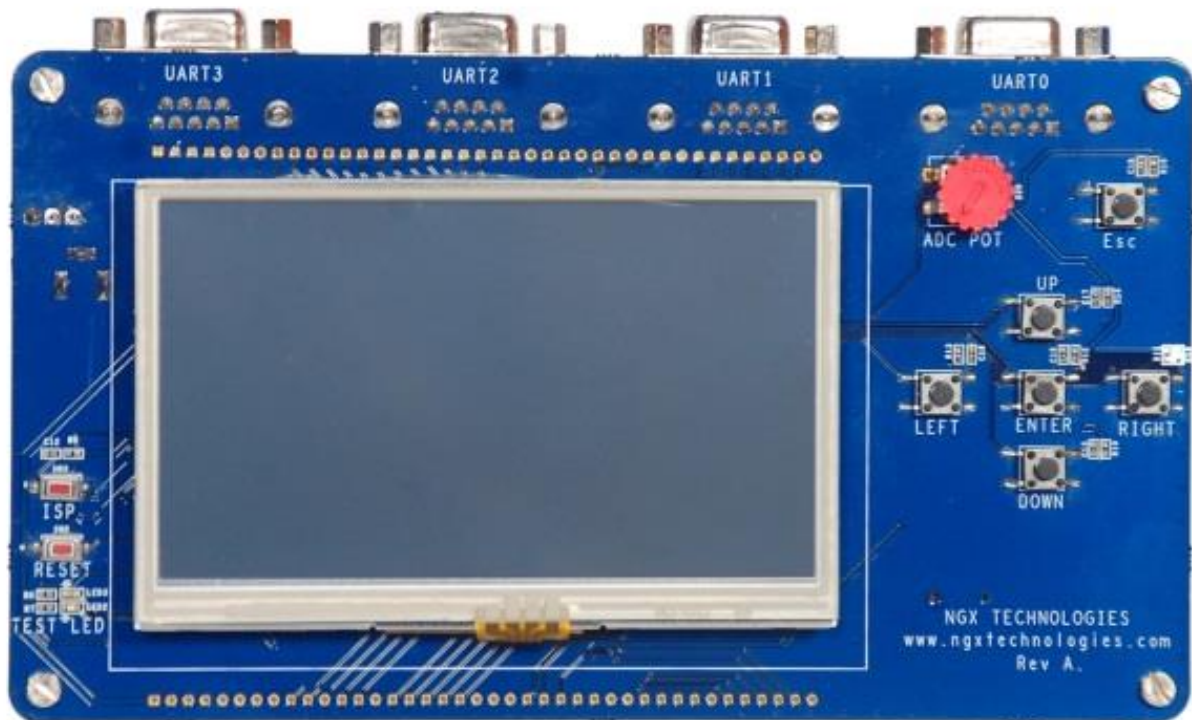


# LPC435x/LPC185x-Xplorer++ with BaseBoard



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## **About NGX Technologies**

NGX Technologies is a premier supplier of development tools for the ARM7, ARM Cortex M0, M3 and M4 series of microcontrollers. NGX provides innovative and cost effective design solutions for embedded systems. We specialize in ARM MCU portfolio, which includes ARM7, Cortex-M0, M3 & M4 microcontrollers. Our experience with developing evaluation platforms for NXP controller enables us to provide solutions with shortened development time thereby ensuring reduced time to market and lower development costs for our customers. Our cost effective and feature rich development tool offering, serves as a testimony for our expertise, cost effectiveness and quality.

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### **CE certification:**

NGX Technologies LPC435x/LPC185x-Xplorer++ with Baseboard has been tested for radiated emission as per EN55022 class A standard. The device is under the limits of the standard EN55022 class A and hence CE marked. No other test have been conducted other than the radiated emission (EN55022 class A standard). The device was tested with the ports like USB, Serial, and Power excluding the GPIO ports. Any external connection made to the GPIO ports may alter the EMC behavior. Usage of this device under domestic environment may cause unwanted interference with other electronic equipment's. User is expected to take adequate measures. The device is not intended to be used in and end product or any subsystem unless the user re-evaluates applicable directive/conformance.

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## 1.0 Introduction

BaseBoard is a new addition to the BlueBoard line from NGX Technologies. This board is intended to extend the functionality of the LPC435x/LPC185x-Xplorer++ board. BaseBoard can be used to extend the features of the LPC435x/LPC185x-Xplorer++ by providing connectors and interface to various peripherals of the board and provide power to the peripheral interface.

## 2.0 Features

- 480x272 Graphics LCD with touch & back light
- Two Test LEDs
- Power Jack
- Power Switch
- Reset Button
- ISP Button
- ADC Pot
- RTC battery
- 6-buttons Keypad
- Serial Connector 0
- Serial Connector 1
- Serial Connector 2
- Serial Connector 3
- GPIO brought to header pins

*Note: Features are dependent on the Xplorer++ boards.*

## 3.0 Getting Started

Before starting you would need the following things handy and ready. For compiling and running programs refer to LPC185x/LPC435x-Xplorer++ [User manual](#).

## 4.0 Requirement

The requirement is put in two sections.

### **Hardware**

- Power adapter – rating 7.5 V, 1 AMP
- Serial cable
- Micro USB cable
- LPC435x/LPC185x-Xplorer++ board

## Software

- PC with Windows OS
- Use HyperTerminal as terminal software
- Coflash
- Test Binaries of LPC435x/LPC185x-Xplorer++ board

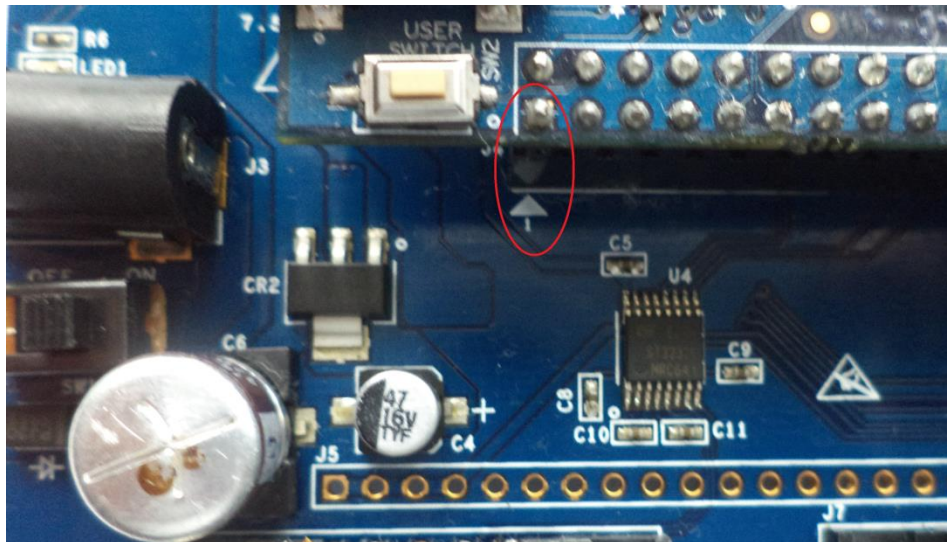
## 5.0 Setup

### Mounting the LPC435x/LPC185x-Xplorer++ Board

The LPC435x/LPC185x-Xplorer++ board should be mounted on the BaseBoard with a particular alignment.

*Note: Improper mounting of the Xplorer++ board on BaseBoard may damage the Xplorer++ board and / the BaseBoard.*

The pin 1 of J10 on Xplorer++ board should be aligned with the pin 1 of J4 female header on BaseBoard. Refer to the marking as shown in the image below.



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## 6.0 Validating the BaseBoard

*Note: You need to flash the Xplorer++ board with the required firmware according to the functionality.*

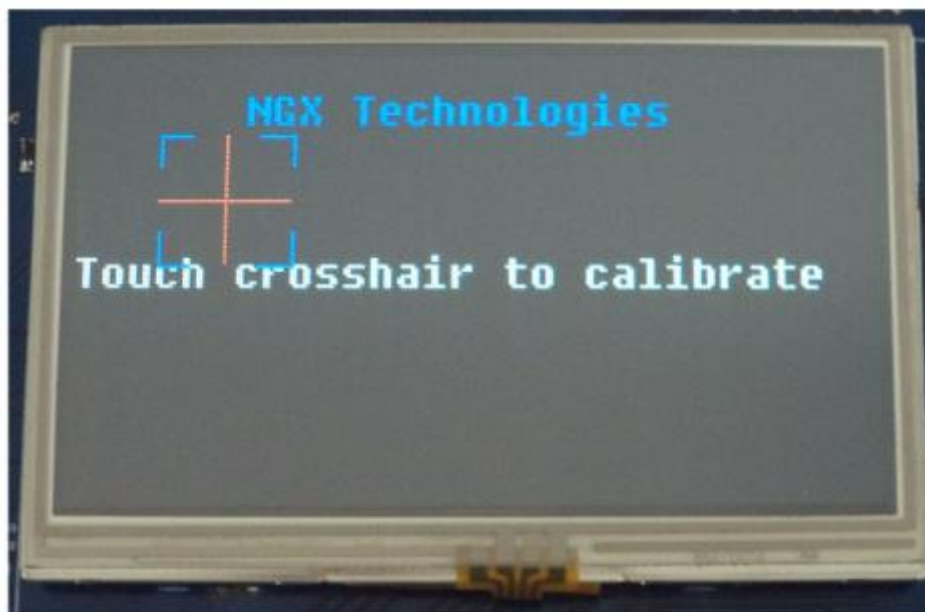
### TEST\_LEDs

Blinky – This blinks the Test LEDs LED2 and LED3 on the BaseBoard.

### LCD

LCD – Reset the board and “NGX Technologies” is displayed on the LCD screen as shown in the following image.

Touch on crosshair to verify LCD touch.



### UART0 to UART3

#### Test setup and verification:

Open the hyper terminal as shown in the below image. To test the UART open the hyper terminal with settings 115200 bps 8N1, i.e.

**Baud Rate: 115200 bps**

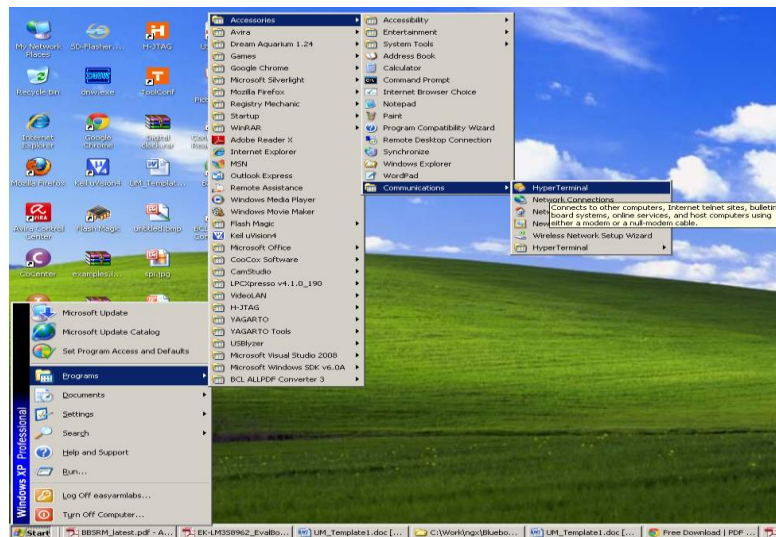
**Bits: 8**

**Parity: None**

**Stop bits: 1**

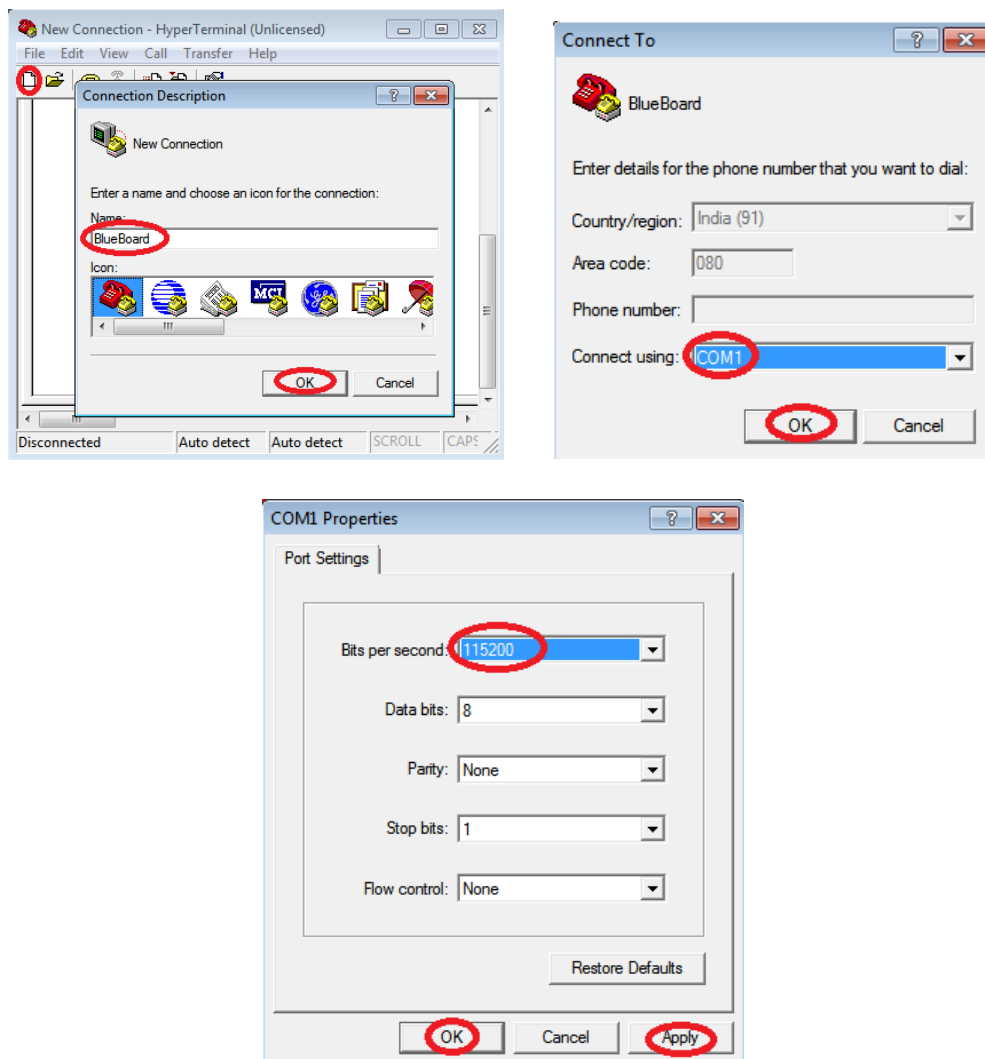
**Flow Control: None**





A 'Connect To' window opens where you have to select the COM port. In this example it is COM1. Click OK. A 'COM1 Properties' window appears. Set the values as shown below. Click OK.

*Note: Please check for your machines COM port number. The COM port number can be different.*

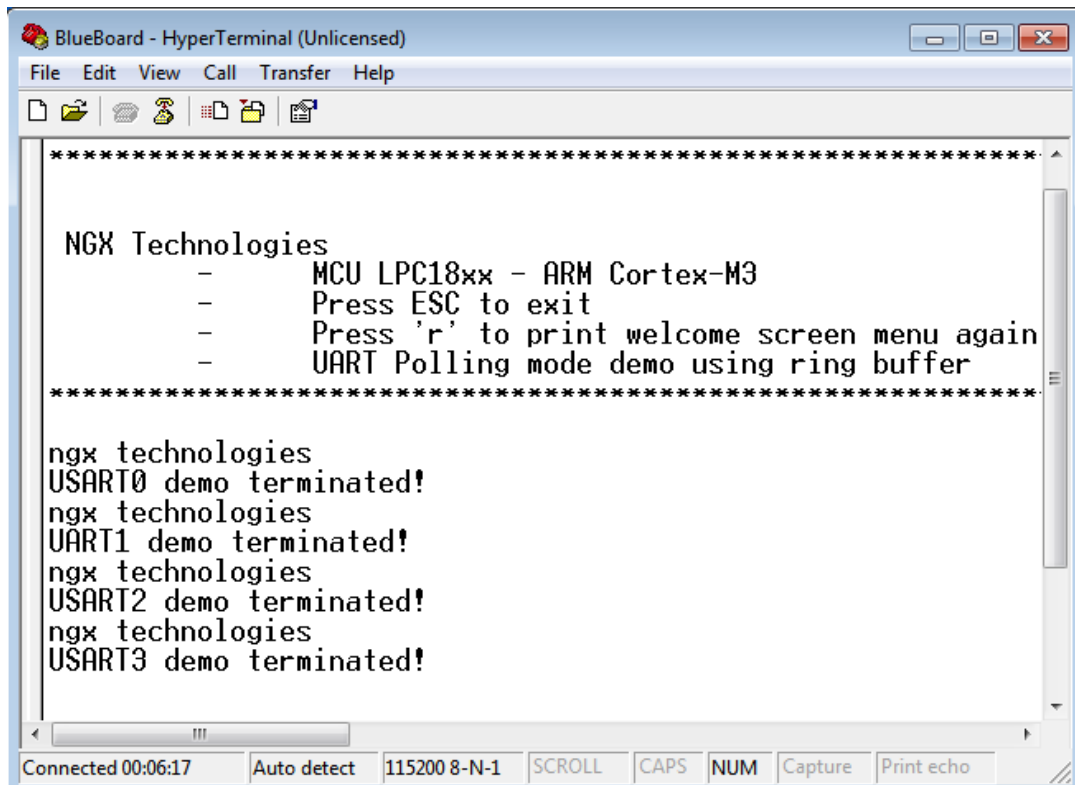


Next a 'Hyper Terminal' window opens as shown below.

Make sure the board is powered and the serial port is connected to the board. The key that are typed on the keyboard are echoed back to the hyper terminal.

First connect serial cable to UART0, type the key on the keyboard that will echo back to the hyper terminal, this verifies the UART0, press ESC to terminate the demo. Follow the same procedure to test UART1, UART2 and UART3.

*Note: UART0 and UART1 are exchanged on the Baseboard.*



## ADC

### Test setup and verification:

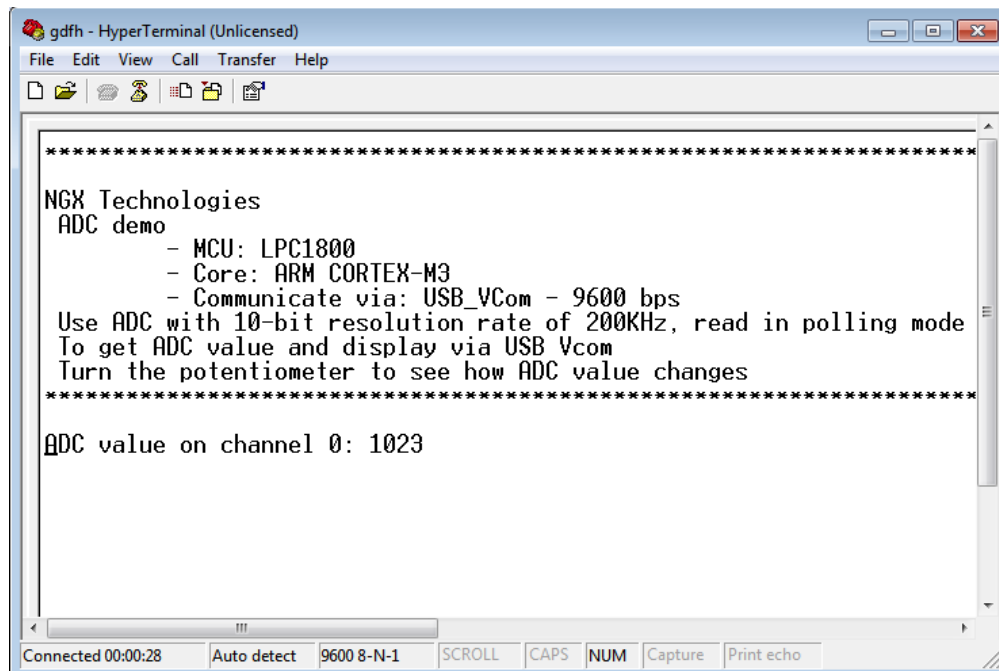
Open the hyper terminal as shown in the below image. To test the ADC open the hyper terminal with settings 9600 bps 8N1, i.e.

ADC value display via USB Virtual Com port, for installing and opening LPC185x/LPC435x USB VCom port please refer the LPC185x/LPC435x-Xplorer++ [Quick Start Guide](#)

After opening the USB VCom port, press User Switch on the Xplorer++ board then menu will display as shown in the below image.

Rotate ADC Pot on the Baseboard to test ADC.





```
gdfh - HyperTerminal (Unlicensed)
File Edit View Call Transfer Help

*****
NGX Technologies
ADC demo
  - MCU: LPC1800
  - Core: ARM CORTEX-M3
  - Communicate via: USB_VCom - 9600 bps
Use ADC with 10-bit resolution rate of 200KHz, read in polling mode
To get ADC value and display via USB Vcom
Turn the potentiometer to see how ADC value changes
*****
ADC value on channel 0: 1023

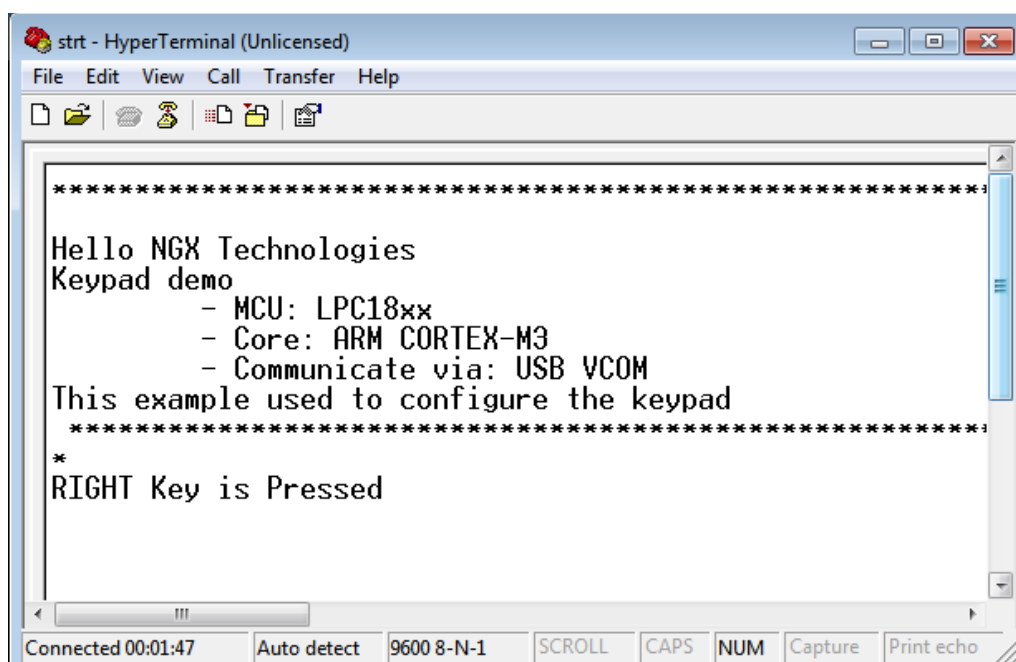
Connected 00:00:28  Auto detect  9600 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

## KEYPAD

### Test setup and verification:

After opening the USB VCom port, press User Switch on the Xplorer++ board then menu will display as shown in the below image.

To test keypad, press each key on the keypad.



```
strt - HyperTerminal (Unlicensed)
File Edit View Call Transfer Help

*****
Hello NGX Technologies
Keypad demo
  - MCU: LPC18xx
  - Core: ARM CORTEX-M3
  - Communicate via: USB VCOM
This example used to configure the keypad
*****
*
RIGHT Key is Pressed

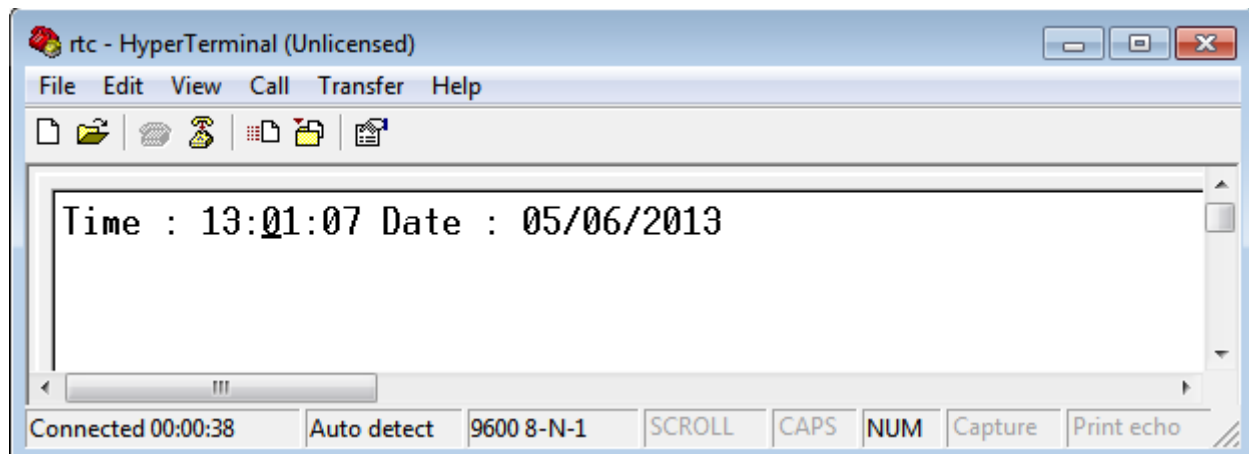
Connected 00:01:47  Auto detect  9600 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

## RTC BATTERY

### Test setup and verification:

You may place the battery (not part of standard deliverables) for the RTC to retain the time even after power off.

RTC value is displayed via USB VCom as shown in the below image



## 7.0 LPC435x/LPC185x-Xplorer++ Programming

### 7.1 Programming options

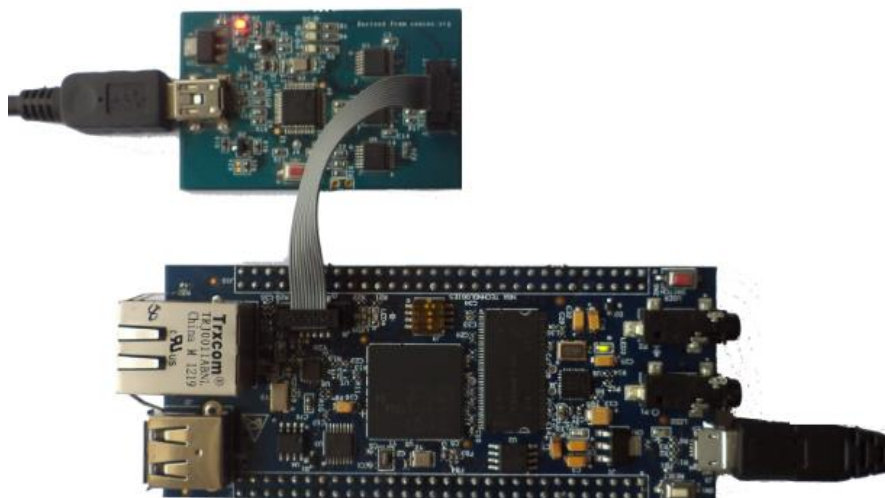
LPC435x/LPC185x-Xplorer++ can be programmed using the

- Coflash and ColinkEx
- Ulink2 and Keil

*Note: For more information on programming the LPC435x/LPC185x-Xplorer++ board, please refer [LPC435x/LPC185x-Xplorer++ board user manual](#).*

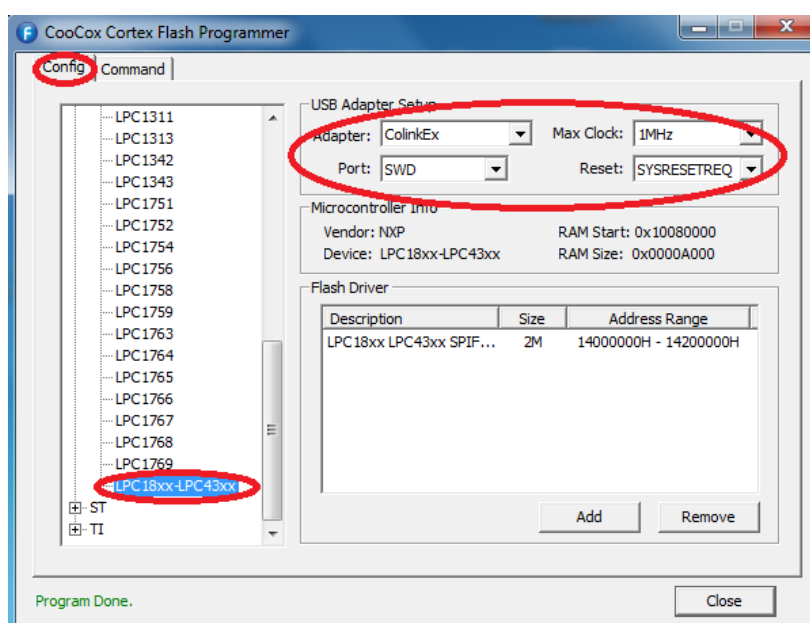
#### 7.1.1 Programming LPC435x/LPC185x-Xplorer++ using Coflash and ColinkEx

Connect one end of 'USB AM to Micro B' cable to LPC435x/LPC185x-Xplorer++ board and other end to computer and connect one end of 'USB AM to Mini B' to ColinkEx and other end to computer as shown in the following image.

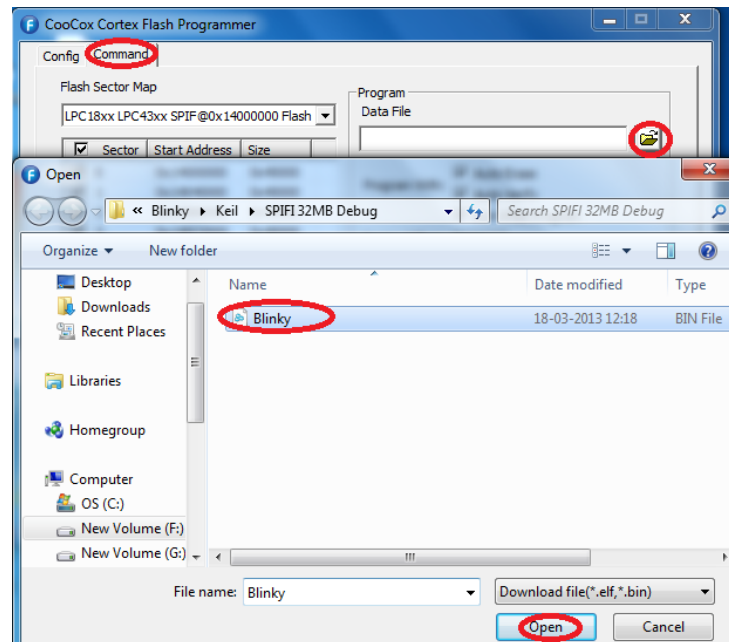


Step 1: Open Coflash, click on config, select controller and set all the fields as shown in the following image.

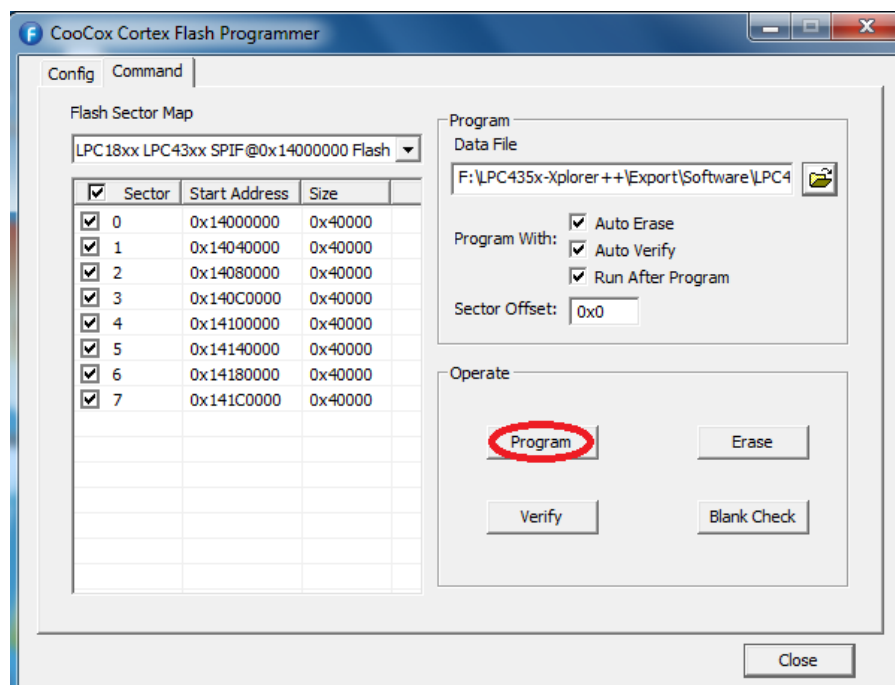
*NOTE: To get the device LPC18xx-LPC43xx in the device list follows the steps given in this [link](#)*



Step 2: Click on Command, select the bin file you want to download as shown in the following image



Step 3: Click on Program to load the bin file to the target board as shown in the following image



Once the programming is completed, reset the board to run the code.

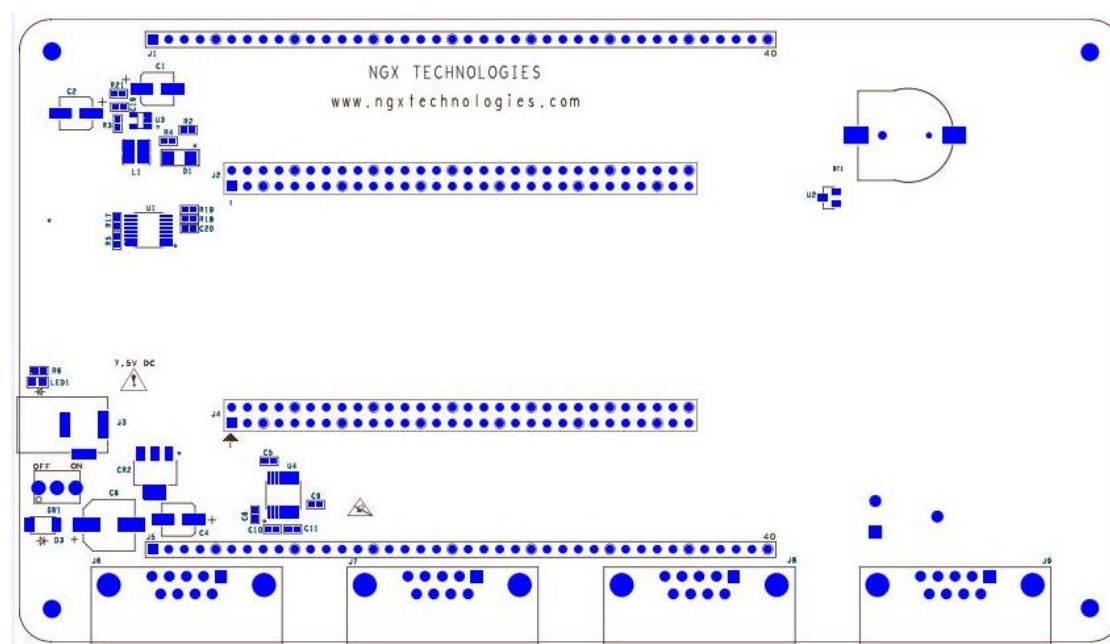
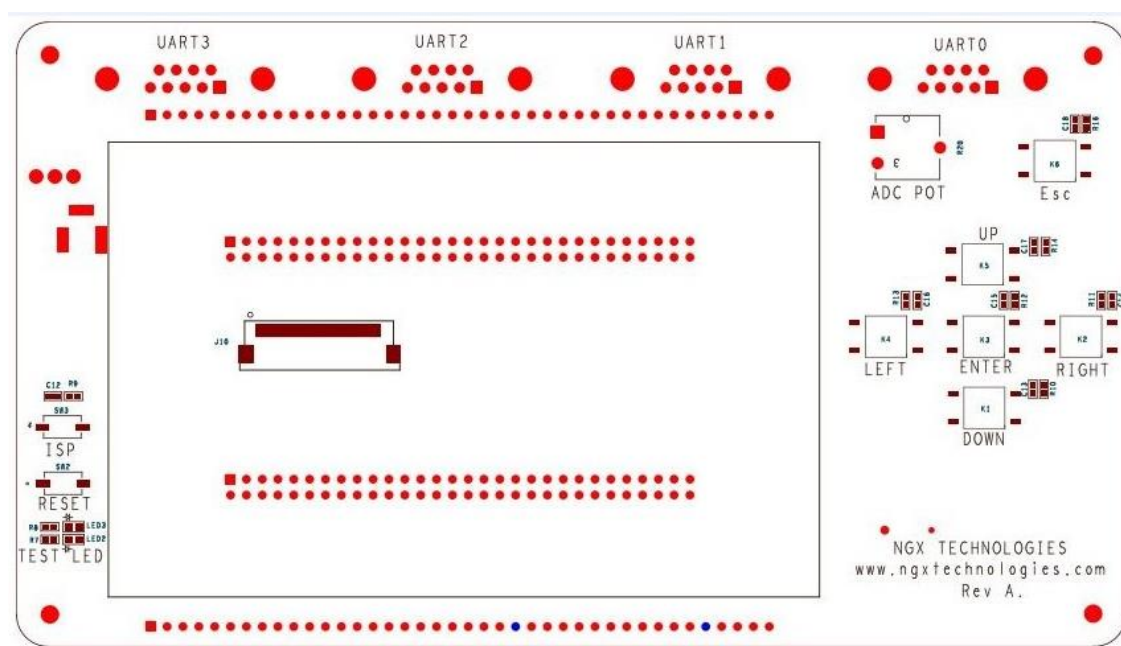
## 8.0 Schematic & Board Layout

### 8.1 Schematic

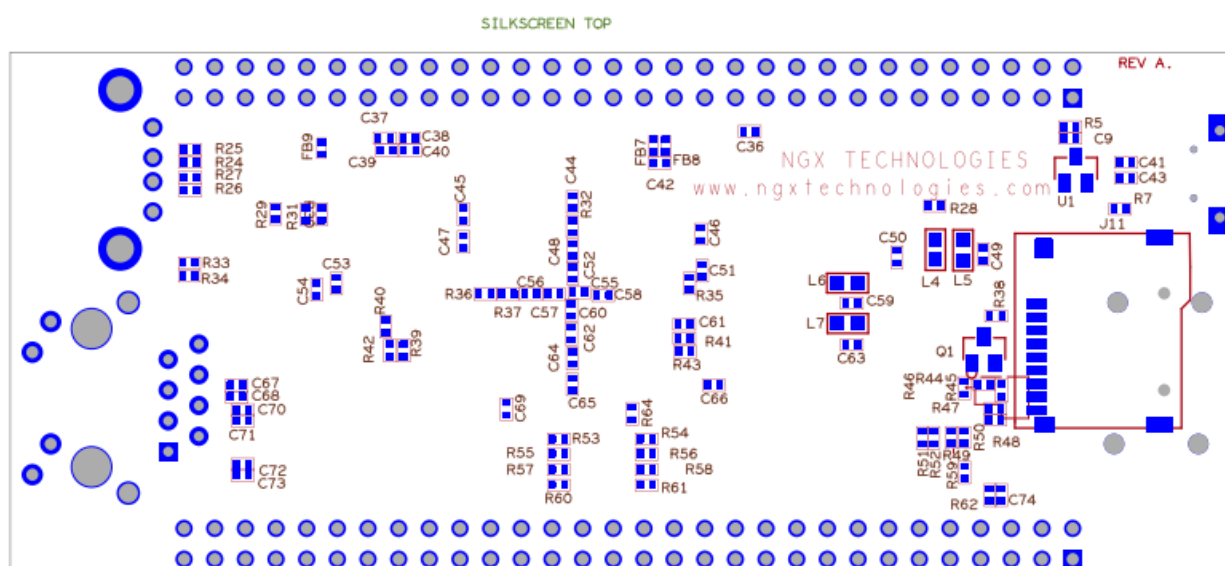
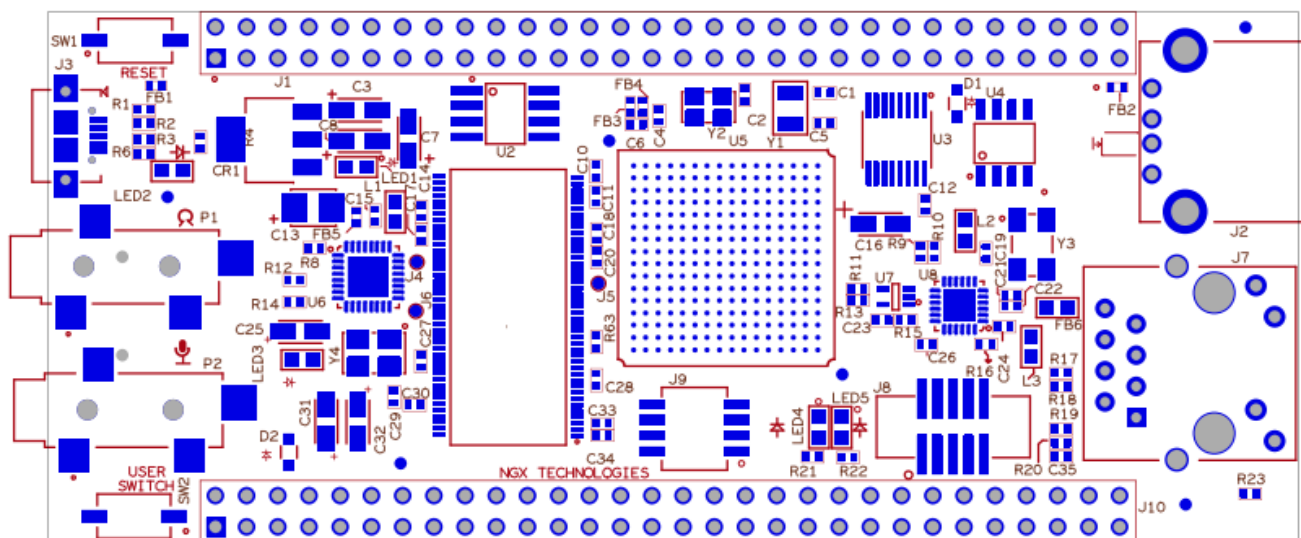
This manual will be periodically updated, please check our [website](http://www.ngxtechnologies.com) for the latest documents. The Board schematic and sample code are available after the product has been registered on our website.

### 8.2 Board layout

#### BaseBoard



## LPC435x/LPC185x-Xplorer++



## 9.0 Change History

### 9.1 Change History

Rev	Changes	Date (dd/mm/yy)	By
1.0	Initial release of the manual	12/06/2013	Veeresh Tumbaragi



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## About this document:

### Revision History

Version: V1.0 author: Veeresh Tumbaragi

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